1978

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Laviña, E., & Figueroa, R. (1978). The use of decapsulated brine shrimp eggs as food for shrimp larvae. SEAFDEC Aquaculture Department Quarterly Research Report, 2(4), 11–14.

http://hdl.handle.net/10862/2334

The use of decapsulated brine shrimp eggs as food for shrimp larvae

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In most shrimp hatcheries throughout the world, freshly hatched nauplii of the brine shrimp *Artemia salina* are being fed to shrimp larvae, fish and other animal larvae.

Sorgeloos et. al (1977), have improved on the utilization of brine shrimp in aquaculture by modifying the techniques of Nakanishi et. al and Morris and Afzelius by removing the outer shell layer of *Artemia* cysts. This decapsulation technqiue removes the tedious and cumbersome process of separating freshly hatched nauplii from the empty shells and other debris, disinfects the cysts from pathogens and makes possible the direct feeding of decapsulated cysts to fish and crustacean larvae. This study was made to test the acceptability of brine shrimp decapsulated eggs to the larvae of some commercially important shrimp species. Direct feeding of decapsulated eggs would eliminate the process of incubating the eggs thereby cutting on labor and energy costs.

Decapsulated cysts of *Artemia salina* were experimentally fed to the larvae of *Penaeus monodon, Metapenaeus ensis, M. endeavouri* and *Macrobrachium rosenbergii* and were found to be comparable to freshly hatched brine shrimp nauplii.

Results of the experiment are presented in Table 1. A single classification ANOVA for the results of each experiment show significance at $P<0.05$ for *P. monodon, P. indicus, M. ensis* and *M. rosenbergii* and a high significance at $P<0.01$ for *P. indicus, M. ensis* and *M. rosenbergii.* Survival of the experimental and control groups in *M. endeavouri* is not significant.

Table 2 shows the mean number of cyst/nauplii consumed per individual per treatment in each experiment. In all experiments, the Student-Newman-Keuls test to compare the mean of the samples show significance at $P<0.05$ between the control and experimental groups. No significant difference was found between the mean of the groups fed with decapsulated cysts and of those fed with freshly hatched nauplii. There was no significant difference in the number of decapsulated cysts or nauplii consumed by the shrimp larvae. The consumption rate of each species however varied.

Direct feeding of decapsulated cysts to shrimp and fish larvae eliminates the process of incubation and hatching of brine shrimp cysts thereby reducing labor costs and simplifying the preparations for larval feeding. Furthermore, decapsulated cysts can be conveniently stored at low temperatures. Decapsulated cysts in diapause which might possibly fail to hatch after incubation become available as food to the shrimp and fish larvae thus reducing losses in feed.

It must be noted that the decapsulated brine shrimp cysts lose some buoyancy due to loss of their outer chorion during decapsulation and tend to sink in seawater. Continuous suspension of the decapsulated cysts when provided with aeration from the bottom or with airwater lift pipes will avoid such problem.

Table 1. Survival of the larvae of *Penaeus monodon, P. indicus, Metapenaeus ensis, M. endeavori,* and *Macrobrachium rosenbergii* fed daily with 2,000 decapsulated cysts (Group B) or 2,000 freshly hatched brine shrimp (Group C). The controls (Group A) and all the other group samples were each given about 15 x 10 *Chaetoceros calcitrans* cells/days

Expt. no	Species	Dates	Initial no. of test ind.	Replicates	Treatments A	B	C	Calc. Fs value
I	*P. monodon*	8/10 to 8/13/77	30	1	15	27	28	
				2	22	28	23	8.61*
				3	20	28	29	
				Ave.	19	27.67	26.67	
II	*P. indicus*	7/13 to 7/18/77	20	1	0	17	15	
				2	4	14	10	29.10**
				3	0	13	13	
				Ave.	1.33	14.67	12.67	
III	*M. ensis*	7/23 to 7/30/77	30	1	4	24	27	
				2	5	29	21	71.896**
				3	2	25	26	
				Ave.	3.67	26	24.67	
IV	*M. endeavori*	7/25 to 8/1 /77	30	1	24	25	21	
				2	20	12	17	0.37
				3	21	20	20	
				Ave.	21.67	19	19.3	
	M. rosenbergii	7/25 to 8/1 /77	30	1	8	26	28	
				2	11	29	28	126.51**
				3	12	27	27	

* Significant at $P < 0.05$

** Highly significant at $P < 0.01$

Tabulated F value at 5% confidence limit is 5.14

Tabulated F value at 1% confidence limit is 10.92

Table 2. Mean number of cysts/nauplii consumed per indiviual per treatment per day

Expt. no.	Species	Dates	Replicates	Treatments B	Treatments C	Calc. F_s values
I	*P. monodon*	8/10 to 8/13/77	1	62.172	68.24	
			2	72.05	83.66	.779
			3	69.03	67.31	
			Ave.	70.084	73.07	
II	*P. indicus*	7/13 to 7/18/77	1	115.1412	109.14	
			2	117.96	122.29	.169
			3	132.39	125.115	
			Ave.	121.83	118.85	
III	*M. ensis*	7/23 to 7/30/77	1	73.46	70.93	
			2	66.49	80.34	2.396
			3	62.93	71.68	
			Ave.	67.63	74.32	
IV	*M. endeavori*	7/25 to 8/1/77	1	73.43	78.30	
			2	107 5	88.37	.459
			3	90.9	84.30	
			Ave.	90.61	83.66	
V	*M. rosenbergii*	7/25 to 8/1 /77	1	65.99	64.43	
			2	65.77	64.31	.260
			3	66.12	67.72	
			Ave.	65.96	66.49	

All F_s values not significant at $P < 0.05$
Tabulated F at 5% confidence limit is 7.71

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